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Laminaria Tents as an Aid in Suction Abortion

KENNETH R. NISWANDER, MD, *Davis*

LAMINARIA HAS PROBABLY been used for centuries to dilate the cervix. The American medical literature of the 1860's and 1870's indicates that laminaria was in common usage in the United States during that period.[1] Infection was a problem that plagued the doctors that used the tents, however, and the tents became a medical relic in the United States, references disappearing from the American medical literature by about 1910.[2] Laminaria tents continued to be used in Europe[3] and their reintroduction in America began two or three years ago. There are already a number of excellent reports of extensive experience with them in the recent American literature.[4-6]

Theoretic uses of laminaria are limited only by one's imagination. Dilatation of the cervix preparatory to invasion of the uterus for intrauterine manipulation is the most obvious use, however. Since gas sterilization has eliminated most of the hazard of infection (Newton reported absence of bacterial growth following gas sterilization even in the middle of the tents), an upsurge of interest in the use of laminaria seems certain.

Laminaria tents are made from laminaria digitata, a species of seaweed which grows in cold ocean waters in various parts of the world. The Japanese have one of the few sources that are both economically accessible and uncontaminated. Seaweed growth in warm ocean waters or plants with hygroscopic action grown on land have historically had a high risk of infection associated with their use and it is probably the relatively clean, cold ocean water that made possible the use of laminaria digitata before adequate gas sterilization became available in the last few years.

The plant, harvested by two-man crews operating from small boats, is brought to shore and placed on drying racks as soon as possible to prevent mold growth from developing. To facilitate drying, the plants are frequently turned on the racks and always positioned so that the stems will dry straight. The dried plants are hand selected and cut to length. Each individual laminaria is shaved to smooth the outer surface.

When packaged, the laminaria tents are about 6 cm long and from 2 to 5 mm in diameter, and they have a string attached to the tip through a hole bored through the tent. Some of the commercially available tents are flared very slightly in their shape so that one end is slightly wider than the other.* Some, however, have an equal diameter throughout.† When placed in water or in tissue the laminaria tent is intensely hygroscopic and swells to three to five times its initial diameter (Figure 1). Most of the swelling apparently takes place in the first six to eight hours, probably less, although it is said that the swelling continues for 24 hours.

Method

This report concerns the use of laminaria tents preceding suction abortion. In the typical case the patient is examined, including pelvic examination, the afternoon before operation. The vagina is cleansed with aqueous zephiran solution. The direction of the cervix is noted and the laminaria tent (typically the medium size) is inserted, usually without difficulty and frequently without the use of a tenaculum on the cervix. In some, but not

From the Department of Obstetrics and Gynecology, University of California, Davis, School of Medicine.

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Reprint requests to: K. R. Niswander, MD, Department of Obstetrics and Gynecology, University of California, Davis, School of Medicine, Davis, CA 95616.

*Milex Products, Inc. (Type B in Figure 1).
†V. Mueller & Co. (Type A in Figure 1).

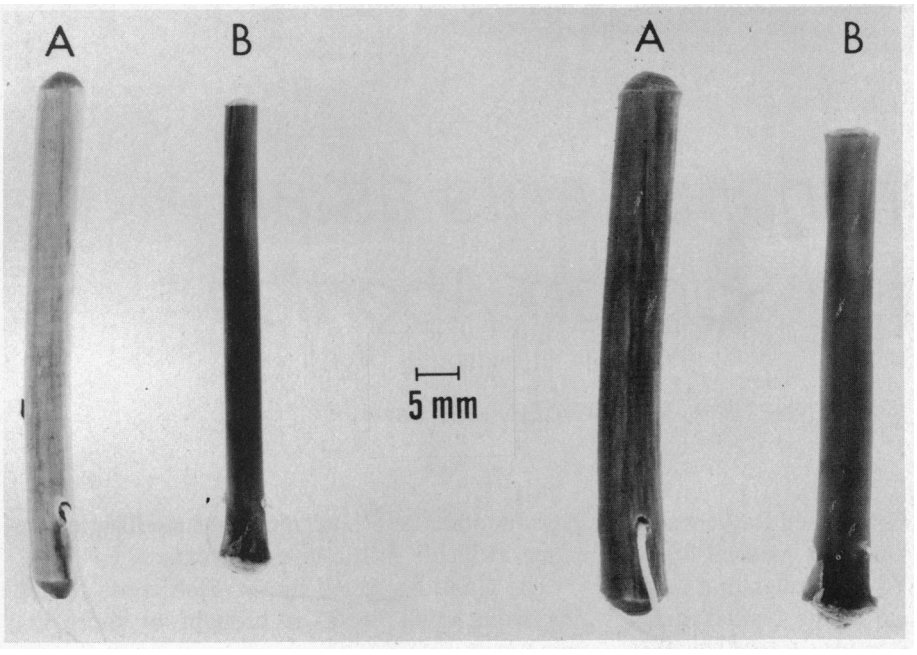

Figure 1.—Two types of laminaria tents. Tent A, V. Mueller. Tent B, Milex. Left—unused. Right, full expansion after placement in water. Note uniform diameter of Tent A and persistence of distal flaring of Tent B.

most, cases the patient has a cramp at the time of insertion. In many patients mild cramps are noted over the next few hours but medication for the cramps is usually not required. (In only one or two instances in our experience was it impossible to insert the laminaria tent, and in three or four cases two tents were inserted into a patulous cervix.)

The following morning the patient is taken to the operating room where the laminaria tent is removed before evacuation of the uterus is begun. No special precautions to prevent infection have been employed. No antibiotic cream is used during the insertion and antibiotics are not given routinely following the abortion.

With appropriate anesthesia the dilatation provided by the laminaria tent is recorded, Hegar dilators being used as the measuring device. Further dilatation, as necessary, is provided with the dilators. Suction curettage is performed in the routine fashion, followed always by brief sharp curettage to insure adequate emptying of the endometrial cavity. Blood and amniotic fluid loss is recorded with precision.

General anesthesia was used in a quarter of our patients, including one patient in whom paracervical anesthesia was insufficient (Table 1). Twenty-seven patients had no anesthesia and the remainder had paracervical block. Preoperative medication for the patients done under local anesthesia usually consisted of morphine sulfate, 10 mg, and diazepam, 5 mg, given subcutaneously about one and a half hours before the procedure. It was unusual for patients under local anesthesia to experience significant pain during the procedure. An occasional patient had severe cramps for a short while after leaving the operating room.

Results

Laminaria tents were used in 327 patients admitted for suction curettage for legal abortion. Fifty-six percent of the patients were nulliparous

TABLE 1.—*Data on Type of Anesthesia and Position of Laminaria at Time of Operation*

	Number	*Percent*
Anesthesia		
Paracervical or none	250	77
General	77	23
Position of Laminaria at Surgery		
In cervix	212	65
In vagina	58	18
Not present	57	17

TABLE 2.—*Data on Parity and Stage of Gestation*

	Number	*Percent*
Parity		
Nulliparous	182	56
Parous	145	44
Gestation		
<8 weeks	41	13
8-10 weeks	177	54
11-12 weeks	91	28
13-14 weeks	15	4
>14 weeks	3	1

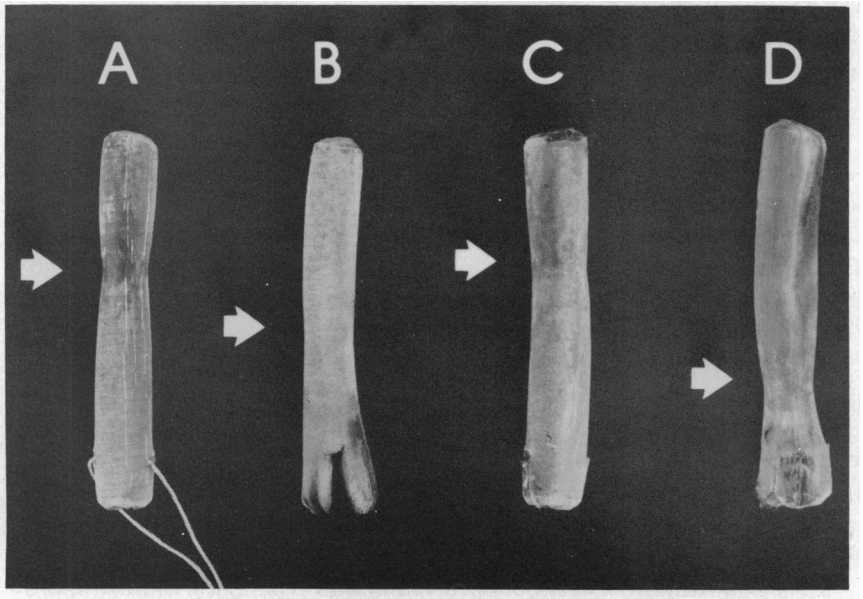

Figure 2.—Type A laminaria tents with uniform diameter throughout from complicated cases. Arrows denote internal os constriction rings. Tent A, normal. Tents B, C, and D identically placed, depict varying degrees of migration, suture pulled out.

and 44 percent were parous; 67 percent were at ten weeks of gestation or less, as estimated by uterine size and confirmed by menstrual dates; 28 percent were at 11 to 12 weeks, and 5 percent were at 13 weeks or more (Table 2).

The position of the laminaria tent was noted at the time of the suction curettage and in two-thirds of the cases it remained in the cervix and was removed therefrom (Table 1). In half of the remaining cases it was lying in the vagina, and in 57 cases it was not found. In most of these cases the patient recalled expelling the laminaria but in a few instances no such history was obtained. In virtually all cases, a thick mucous plug exuded from the cervix.

Cervical dilatation measured when the laminaria tent was removed was found to be at least 9 mm in 70 percent of patients (Table 3). Greater dilatation was found more frequently with longer gestational intervals and among parous patients. In 8 percent of patients the dilatation was found to be 6 mm or less—for the most part, fortunately, in patients not long in gestation. Further dilatation to accommodate the needed suction curet was easy in most instances, but in 22 cases some difficulty was encountered with further dilatation.

Not unexpectedly, gestation of greater than 12 weeks was associated with larger blood losses (Table 4). The larger volume of amniotic fluid at later gestations accounts for a small amount of the difference. General anesthesia also increased the blood loss (Table 5). The most important anesthesia difference is with very large blood losses. Only one patient receiving paracervical anesthesia had a blood loss of 500 ml, while five patients under general anesthesia had losses of 1,200, 500, 450, and two of 400 ml.

TABLE 3.—*Cervical Dilatation at Time of Operation*

Weeks of Gestation	*Dilatation (millimeters)*			
	6 or less	*7 to 8*	*9 to 10*	*11 or more*
10 or less	9%	25%	46%	20%
11 to 12	4%	12%	47%	37%
13 or more	6%	13%	37%	44%

TABLE 4.—*Blood Loss Related to Duration of Pregnancy (milliliters)*

Weeks of Gestation	*0 to 25*	*<50*	*<100*	*<150*	*<200*	*<250*	*<300*	*>300*
10 or less	12%	43%	33%	6%	5%	..	1%	0.5%
11 to 12	3%	21%	47%	8%	17%	2%	..	1%
13 or more	..	..	17%	22%	17%	11%	5%	28%

TABLE 5.—*Blood Loss Related to Type of Anesthesia (milliliters)*

Anesthesia	*0 to 25*	*<50*	*<100*	*<150*	*<200*	*<250*	*<300*	*>300*
Paracervical and none	12%	34%	40%	5%	7%	1%	0.5%	0.5%
General	4%	24%	38%	13%	10%	2%	4%	6%

Complications occurred with 17 patients. Two had small cervical lacerations from the tenaculum. Tracheotomy was required in three patients, and two of them had postoperative fever. Ten patients had subsequent endometritis or an incomplete abortion and six of these were admitted to hospital for a second dilatation and curettage. None was seriously ill. Two patients had unexplained fever in the postoperative period and one of these probably had an unrecognized perforation of the uterus. She did well after a mild illness of two or three days' duration.

The three patients who required tracheotomy have been described elsewhere.[7] In all three instances, a laminaria tent with uniform diameter throughout its length was used. We now feel that it is important that the distal end of the laminaria be flared slightly to prevent migration of the tent toward the endometrial cavity. Figure 2 illustrates the varying location of the constriction ring produced by the internal os when the tent of uniform diameter is used. Tent A shows what is a usual and normal position of the constriction ring. Tents B, C, and D were placed identically in the cervix at the time of insertion, yet they illustrate varying degrees of migration in the uterus. In all three cases the string of the laminaria tent broke when pulled, and in all three cases the tent migrated so far toward the fundus that it could not be reached with any instrument. Although the surgical procedure required to remove the tent was minor, this certainly must be considered a serious complication.

Discussion

The use of the laminaria tent has greatly simplified our practice of legal abortion. Suction curettage has proved to be easier and safer than sharp curettage[8] but the major problem with abortion has continued to be the difficulty of cervical dilatation. With few exceptions, the use of laminaria tents has eliminated that problem in our practice. It has made possible the use of an outpatient setting for abortion since the pain associated with cervical dilatation is now seldom experienced by our patients. Although we routinely use paracervical anesthesia, it is evident that many of our patients would tolerate the procedure very well without any anesthesia. Paracervical anesthesia without the laminaria tent was found to be inadequate in our hands for instrumental dilatation of the cervix; the use of the tent has changed this situation completely.

Hazards of the laminaria tent should be constantly considered. Certainly our experience and that of Newton et al indicate a low risk of infection with gas-sterilized devices. Perforation with the laminaria tent did not occur in our hands but should be constantly guarded against by gentle and precise sounding of the uterus before insertion of the tent. We have not been able to prevent the occasional premature extrusion of the laminaria tent but this cannot be considered a major hazard. Migration of the tent toward the uterine fundus has not occurred in our experience with an appropriately flared tent. The hazards of legal abortion with the laminaria tent and suction curettage seem greatly reduced as compared with the risk formerly associated with instrumental dilatation and sharp curettage.

We have used laminaria tents before saline solution abortion in an attempt to reduce the time interval between injection and abortion. Our experience is too limited to report at this time. Laminaria tents may be useful in preparing the cervix for an indicated induction of labor near term, and the tents may be helpful in the treatment of cervical strictures, dysmenorrhea, and related conditions.

Figures 1 and 2 reproduced with the kind permission of the publisher from the *American Journal of Obstetrics and Gynecology* 114:835-836, Hanson F W, Niswander K, Trelford J D, 1972.

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